

PROJECT MEMORANDUM

DATE: July 8, 1993
TO: Joe Depner, Hydrogeologist
FROM: Nels Cone, Chemist/BC
SUBJECT: DATA VALIDATION OF ANALYTICAL RESULTS FROM PIER 91 RCRA
FACILITY INVESTIGATION, PROJECT 624878, DATA SET #10A2-10C2

FILE COPY

On February 9, 1993, one soil sample was collected by Burlington Environmental Inc. personnel. This sample was submitted to Sound Analytical Services of Tacoma, Washington for volatile organic (EPA SW-846 Method 8240), semivolatile organic (EPA SW-846 Method 8270), and Total Petroleum Hydrocarbon (EPA SW-846 Methods 418.1 and 8015) analyses (work order 30127). I performed a review of the analytical results for sample CP-115B-36-38.

A properly completed chain-of-custody form was included (#6269), along with signatures from field to laboratory receipt. The sample was shown as having been properly iced and received in good condition. Holding times were evaluated according to regulatory protocol (*National Functional Guidelines for Organic Data Review*, USEPA, 1990). Instances when holding times did not meet required guidelines are noted below. The sample received the analyses required by the Quality Assurance Project Plan (QAPP), and laboratory extraction/analysis times met the established guidelines. Proper data qualifier flags were used by the laboratory with the exceptions noted below.

Data Set 10A2:

For volatile analysis, the sample holding time did not meet the required guidelines. As such, all results from this sample must be considered estimates and should have "J" flags appended to them. The method blank contained methylene chloride, acetone, and toluene; results received the proper "B" data qualifier flag as needed. All surrogate recoveries were within required quality control (QC) limits. Matrix spike/matrix spike duplicate analyses demonstrated appropriate analytical accuracy and relative percent differences (RPD) between the two analyses indicate acceptable analytical precision. Supporting QC documentation included bromofluorobenzene tuning data, continuing calibration verification, and sample chromatograms. Data consistency was demonstrated throughout.

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Memorandum from Nels Cone

Subject: Pier 91 Data Validation, Data Set #10A2-10C2

July 8, 1993

Data Set 10B2:

The holding time for semivolatile analyses met required guidelines. Di-n-butylphthalate, di-n-octylphthalate and bis(2-ethylhexyl)phthalate appear as laboratory contaminants; results for these analytes did not always receive the required "B" data qualifier flag. Surrogate recoveries for the sample were within QC limits. Matrix spike/matrix spike duplicate (MS/MSD) analyses were within QC limits with the exception of 1,4-dichlorobenzene and 1,2,4-trichlorobenzene. Overall, analytical accuracy remains intact because these analytes were not detected in the samples. Furthermore, the RPD between the MS/MSD results indicate acceptable analytical precision. Supporting QC documentation included decafluorotriphenylphosphine tuning data, continuing calibration verification and sample chromatograms. Data consistency was demonstrated throughout.

Data Set 10C2:

Results from Total Petroleum Hydrocarbon analyses indicate that holding times for this sample were met without incident. Surrogate recoveries were within required QC limits. Duplicate analyses were performed, and appropriate analytical precision is displayed. Matrix spike analyses indicate required analytical accuracy was achieved. The method blank analysis results met required QC criteria and no corrections were needed. Supporting QC documentation included continuing calibration curves along with sample, spike and method blank chromatograms. Data consistency was demonstrated throughout.

RECOMMENDATIONS

In order to satisfy the data quality objectives as defined in Table F-2 of the QAPP, the following actions should be taken. All reported detections of volatile compounds in sample CP-115B-36-38 should receive a "J" data qualifier flag. All reported detections of di-n-butylphthalate, di-n-octylphthalate and bis(2-ethylhexyl)phthalate should receive "B" data qualifier flags. This data set can then be considered valid for its intended use.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4313 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

April 26, 1993

TO: Burlington Environmental Engineering

PROJECT NUMBER: 624878-7304

PROJECT NAME: Pier 91

LABORATORY WORK ORDER NUMBER: 30127

The sample was taken on 2/9/93 and was received at Sound on 2/10/93. The sample was analyzed for Volatile Organics in accordance with EPA SW-846 Method 8240, Semivolatile Organics in accordance with EPA SW-846 Method 8270, Total Petroleum Fuel Hydrocarbons by EPA Method 8015 modified, and Total Petroleum Hydrocarbons by EPA Method 418.1 modified for soil.

VOLATILE ORGANICS

Sample 30127-1 was analyzed on 2/25/93, which was two days past the required holding time. Methylene chloride, acetone, and toluene were detected in the associated method blank at levels above the IDL. Results reported for these compounds in the sample were flagged B to indicate this. All QC other parameters were within acceptance limits.

SEMIVOLATILE ORGANICS

Sample 30127-1 was extracted on 2/12/93 and analyzed on 2/25/93. Di-n-butylphthalate was detected in the method blank above the IDL. The percent recoveries for 1,4-dichlorobenzene and 1,2,4-trichlorobenzene were below advisory limits in the matrix spike/matrix spike duplicate analyses for this sample. All other QC parameters were within acceptance limits.

TOTAL PETROLEUM FUEL HYDROCARBONS

Sample 30127-1 was extracted and analyzed on 2/22/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

TOTAL PETROLEUM HYDROCARBONS

Sample 30127-1 was extracted and analyzed on 2/16/93. No contamination above the PQL was present in the method blank. All QC parameters were within acceptance limits.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental, Date: March 6, 1993
Technical Services

Report On: Analysis of Soil

Lab No.: 30127

Page 1 of 6

IDENTIFICATION:

Sample received on 02-10-93

Project: 624878-7304 Pier 91

Client ID: CP-115B-36-38

ANALYSIS:

Volatile Organics by Method 8240

Date Extracted: 2-11-93

Date Analyzed: 2-25-93

Compound	Concentration ug/kg	PQL	Flag
Chloromethane	ND	10	
Bromomethane	ND	10	
Vinyl Chloride	ND	10	
Chloroethane	ND	10	
Methylene Chloride	103	5	B1
Acetone	28	50	B1, J
Carbon Disulfide	ND	5	
1,1-Dichloroethene	ND	5	
1,1-Dichloroethane	ND	5	
1,2-Dichloroethene (Total)	ND	5	
Chloroform	ND	5	
1,2-Dichloroethane	ND	5	
2-Butanone	ND	25	
1,1,1-Trichloroethane	ND	5	
Carbon Tetrachloride	ND	5	
Vinyl Acetate	ND	25	
Bromodichloromethane	ND	5	
1,2-Dichloropropane	ND	5	
Cis-1,3-Dichloropropene	ND	5	
Trichloroethene	ND	5	
Dibromochloromethane	ND	5	
1,1,2-Trichloroethane	ND	5	

ND = Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
 Project: 624878-7304 Pier 91
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 Lab No. 30127
 March 6, 1993

Client ID: CP-115B-36-38

8240 Continued . . .

Compound	Concentration ug/kg	PQL	Flag
Benzene	ND	5	B1
Trans-1,3-Dichloropropene	ND	5	
Bromoform	ND	5	
4-Methyl-2-Pentanone	ND	25	
2-Hexanone	ND	5	
Tetrachloroethene	ND	5	
1,1,2,2-Tetrachloroethane	ND	5	
Toluene	4.6	5	
Chlorobenzene	ND	5	
Ethyl Benzene	ND	5	
Styrene	ND	5	
Total Xylenes	ND	5	

ND - Not Detected

PQL - Practical Quantitation Limit

Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits	
		Water	Soil
Toluene - D8	99	88 - 110	81 - 117
Bromofluorobenzene	100	86 - 115	74 - 121
1,2-Dichloroethane-D4	98	76 - 114	70 - 121

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91
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Lab No. 30127
March 6, 1993

Client ID: CP-115B-36-38

Semivolatile Organics Per EPA SW-846 Method 8270

Date Extracted: 2-12-93

Date Analyzed: 2-25-93

Compound	Concentration, ug/kg	PQL	Flag
Phenol	ND	410	
bis(2-Chloroethyl) ether	ND	410	
2-Chlorophenol	ND	410	
1,3-Dichlorobenzene	ND	410	
1,4-Dichlorobenzene	ND	410	
Benzyl Alcohol	ND	820	
1,2-Dichlorobenzene	ND	410	
2-Methylphenol	ND	410	
bis(2-Chloroisopropyl) ether	ND	410	
4-Methylphenol	ND	410	
N-Nitroso-Di-N-propylamine	ND	410	
Hexachloroethane	ND	410	
Nitrobenzene	ND	410	
Isophorone	ND	410	
2-Nitrophenol	ND	410	
2,4-Dimethylphenol	ND	410	
Benzoic Acid	ND	2,100	
bis(2-Chloroethoxy)methane	ND	410	
2,4-Dichlorophenol	ND	410	
1,2,4-Trichlorobenzene	ND	410	
Naphthalene	ND	410	
4-Chloroaniline	ND	820	
Hexachlorobutadiene	ND	410	
4-Chloro-3-methylphenol	ND	820	

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
 Project: 624878-7302 Pier 91
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 Lab No. 30127
 March 6, 1993

Client ID: CP-115B-36-38

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
2-Methylnaphthalene	ND	410	
Hexachlorocyclopentadiene	ND	410	
2,4,6-Trichlorophenol	ND	410	
2,4,5-Trichlorophenol	ND	410	
2-Chloronaphthalene	ND	410	
2-Nitroaniline	ND	2,100	
Dimethyl phthalate	ND	410	
Acenaphthylene	ND	410	
2,6-Dinitrotoluene	ND	410	
3-Nitroaniline	ND	2,100	
Acenaphthene	ND	410	
2,4-Dinitrophenol	ND	2,100	
4-Nitrophenol	ND	2,100	
Dibenzofuran	ND	410	
2,4-Dinitrotoluene	ND	410	
Diethylphthalate	ND	410	
4-Chlorophenyl phenyl ether	ND	410	
Fluorene	ND	410	
4-Nitroaniline	ND	2,100	
4,6-Dinitro-2-methylphenol	ND	2,100	
N-Nitrosodiphenylamine	ND	410	
4-Bromophenyl phenyl ether	ND	410	
Hexachlorobenzene	ND	410	
Pentachlorophenol	ND	2,100	
Phenanthrene	ND	410	
Anthracene	ND	410	
Di-n-butylphthalate	290	410	B, J

ND - Not Detected

Continued

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
 Project: 624878-7302 Pier 91
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 Lab No. 30127
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Client ID: CP-115B-36-38

EPA Method 8270 Continued

Compound	Concentration ug/kg	PQL	Flag
Fluoranthene	ND	410	J
Pyrene	ND	410	
Butyl benzyl phthalate	ND	410	
3,3'-Dichlorobenzidine	ND	820	
Benzo(a)anthracene	ND	410	
Chrysene	ND	410	
bis(2-ethylhexyl)phthalate	68	410	
Di-n-octyl phthalate	ND	410	
Benzo(b)fluoranthene	ND	410	
Benzo(k)fluoranthene	ND	410	
Benzo(a)pyrene	ND	410	
Indeno(1,2,3-cd)pyrene	ND	410	
Dibenz(a,h)anthracene	ND	410	
Benzo(g,h,i)perylene	ND	410	

ND - Not Detected

PQL - Practical Quantitation Limit

Semi-Volatile Surrogates

Surrogate Compound	Percent Recovery	Control Limits	
		Water	Soil
Nitrobenzene - d ₅	67	35 - 114	23 - 120
2-Fluorobiphenyl	62	43 - 116	30 - 115
p-Terphenyl-d ₁₄	90	33 - 141	18 - 137
Phenol-d ₆	64	10 - 94	24 - 113
2-Fluorophenol	78	21 - 100	25 - 121
2,4,6-Tribromophenol	84	10 - 123	19 - 122

SOUND ANALYTICAL SERVICES, INC.

Burlington Environmental, Technical Services
Project: 624878-7302 Pier 91
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Lab No. 30127
March 6, 1993

Client ID: CP-115B-36-38

TPH Per EPA Method 418.1
Date Extracted: 2-16-93
Date Analyzed: 2-16-93

Total Petroleum
Hydrocarbons, mg/kg 14

TPH Per EPA SW-846 Modified Method 8015
Date Extracted: 2-22-93
Date Analyzed: 2-22-93

Total Petroleum
Fuel Hydrocarbons, mg/kg < 10

<u>SURROGATE RECOVERY, %</u>	
1-chlorooctane	116
o-terphenyl	123

SOUND ANALYTICAL SERVICES


DENNIS L. BEAN

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

VOLATILE ORGANICS PER EPA METHOD 8240

Page 1 of 2

Client: Burlington Environmental, Technical Services
Lab No: 30127qc3
Units: ug/kg
Date: March 6, 1993

METHOD BLANK

Compound	Blank Value	PQL	FLAGS
Chloromethane	ND	10	J
Bromomethane	ND	10	
Vinyl Chloride	ND	10	
Chloroethane	ND	10	
Methylene Chloride	59	5	
Acetone	17	50	
Carbon Disulfide	ND	5	
1,1-Dichloroethene	ND	5	
1,1-Dichloroethane	ND	5	
1,2-Dichloroethene (Total)	ND	5	
Chloroform	ND	5	
1,2-Dichloroethane	ND	5	
2-Butanone	ND	25	
1,1,1-Trichloroethane	ND	5	
Carbon Tetrachloride	ND	5	
Vinyl Acetate	ND	25	
Bromodichloromethane	ND	5	
1,2-Dichloropropane	ND	5	
Cis-1,3-Dichloropropene	ND	5	
Trichloroethene	ND	5	
Dibromochloromethane	ND	5	J
1,1,2-Trichloroethane	ND	5	
Benzene	ND	5	
Trans-1,3-Dichloropropene	ND	5	
Bromoform	ND	5	
4-Methyl-2-Pentanone	ND	25	
2-Hexanone	ND	5	
Tetrachloroethene	ND	5	
1,1,2,2-Tetrachloroethane	ND	5	
Toluene	3.6	5	
Chlorobenzene	ND	5	J
Ethyl Benzene	ND	5	
Styrene	ND	5	
Total Xylenes	ND	5	

Continued

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

VOLATILE ORGANICS PER EPA METHOD 8240

Page 2 of 2

Client: Burlington Environmental, Technical Services
Lab No: 30127qc3
Units: ug/kg
Date: March 6, 1993

METHOD BLANK

ND - Not Detected

PQL - Practical Quantitation Limit

VOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits	
		Water	Soil
Toluene - d8	97	86 - 115	81 - 117
Bromofluorobenzene	101	76 - 114	74 - 121
1,2-Dichloroethane d4	98	88 - 110	70 - 121

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

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QUALITY CONTROL REPORT

VOLATILE ORGANICS - METHOD 8240

Client: Burlington Environmental, Technical Services
Lab No: 30127qc6
Units: ug/kg
Date: March 6, 1993

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

MSD No. 30127-1

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Spike Dup Result (MSD)	Spike Added (SA)	%R	RPD
1,1-DCE	ND	70	60	117	67	60	112	4.4
TCE	ND	82	60	137	80	60	133	2.5
Chloro-benzene	ND	82	60	137	80	60	133	2.5
Toluene	ND	83	60	138	85	60	142	2.4
Benzene	ND	87	60	145	84	60	140	4.7

RPD = Relative Percent Difference

$$= [(MS - MSD) / ((MS + MSD) / 2)] \times 100$$

% REC = Percent Recovery

$$= [(MS - SAMPLE RESULT) / SPIKE] \times 100$$

Advisory Limits:

	<u>RPD</u>	<u>% RECOVERY</u>
1,1-Dichloroethene	22	59 - 172
Trichloroethene	24	62 - 137
Chlorobenzene	21	60 - 133
Toluene	21	59 - 139
Benzene	21	66 - 142

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 1 of 3

Client: Burlington Environmental, Technical Services
Lab No: 30127qc4
Units: ug/kg
Date: March 6, 1993
Blank No: SBLK47-S7957

METHOD BLANK

Compound	Blank Value	PQL	Flags
Phenol	ND	330	
bis(2-Chloroethyl) ether	ND	330	
2-Chlorophenol	ND	330	
1,3-Dichlorobenzene	ND	330	
1,4-Dichlorobenzene	ND	330	
Benzyl Alcohol	ND	670	
1,2-Dichlorobenzene	ND	330	
2-Methylphenol	ND	330	
bis(2-Chloroisopropyl) ether	ND	330	
4-Methylphenol	ND	330	
N-Nitroso-Di-N-propylamine	ND	330	
Hexachloroethane	ND	330	
Nitrobenzene	ND	330	
Isophorone	ND	330	
2-Nitrophenol	ND	330	
2,4-Dimethylphenol	ND	330	
Benzoic Acid	ND	1,700	
bis(2-Chloroethoxy)methane	ND	330	
2,4-Dichlorophenol	ND	330	
1,2,4-Trichlorobenzene	ND	330	
Naphthalene	ND	330	
4-Chloroaniline	ND	670	
Hexachlorobutadiene	ND	330	
4-Chloro-3-methylphenol	ND	670	
2-Methylnaphthalene	ND	330	
Hexachlorocyclopentadiene	ND	330	
2,4,6-Trichlorophenol	ND	330	
2,4,5-Trichlorophenol	ND	330	
2-Chloronaphthalene	ND	330	
2-Nitroaniline	ND	1,700	
Dimethyl phthalate	ND	330	
Acenaphthylene	ND	330	

Continued

SOUND ANALYTICAL SERVICES, INC.

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 2 of 3

Client: Burlington Environmental, Technical Services
 Lab No: 30127qc4
 Units: ug/kg
 Date: March 6, 1993
 Blank No: SBLK47-S7957

METHOD BLANK

Compound	Blank Value	PQL	Flags
3-Nitroaniline	ND	1,700	
Acenaphthene	ND	330	
2,4-Dinitrophenol	ND	1,700	
4-Nitrophenol	ND	1,700	
Dibenzofuran	ND	330	
2,4-Dinitrotoluene	ND	330	
2,6-Dinitrotoluene	ND	330	
Diethylphthalate	ND	330	
4-Chlorophenyl phenyl ether	ND	330	
Fluorene	ND	330	
4-Nitroaniline	ND	1,700	
4,6-Dinitro-2-methylphenol	ND	1,700	
N-Nitrosodiphenylamine	ND	330	
4-Bromophenyl phenyl ether	ND	330	
Hexachlorobenzene	ND	330	
Pentachlorophenol	ND	1,700	
Phenanthrene	ND	330	
Anthracene	ND	330	
Di-n-butylphthalate	2,100	330	
Fluoranthene	ND	330	
Pyrene	ND	330	
Butyl benzyl phthalate	ND	330	
3,3'-Dichlorobenzidine	ND	670	
Benzo(a)anthracene	ND	330	
bis(2-ethylhexyl)phthalate	ND	330	
Chrysene	ND	330	
Di-n-octyl phthalate	ND	330	
Benzo(b)fluoranthene	ND	330	
Benzo(k)fluoranthene	ND	330	
Benzo(a)pyrene	ND	330	
Indeno(1,2,3-cd)pyrene	ND	330	
Dibenz(a,h)anthracene	ND	330	
Benzo(g,h,i)perylene	ND	330	

Continued. . . .

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

SEMIVOLATILE ORGANICS PER EPA METHOD 8270

Page 3 of 3

Client: Burlington Environmental, Technical Services
Lab No: 30127qc4
Units: ug/kg
Date: March 6, 1993
Blank No: SBLK47-S7957

ND - Not Detected.

PQL - Practical Quantitation Limit

SEMIVOLATILE SURROGATES

Surrogate	Percent Recovery	Control Limits	
		Water	Soil
Nitrobenzene - d5	76	35 - 114	23 - 120
2-Fluorobiphenyl	77	43 - 116	30 - 115
p-Terphenyl-d14	89	33 - 141	18 - 137
Phenol-d6	67	10 - 94	24 - 113
2-Fluorophenol	79	21 - 100	25 - 121
2,4,6-TBP	75	10 - 123	19 - 122

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-3047

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Client Name: Burlington Environmental, Technical Services
Lab No: 30127qc5
Date: March 6, 1993

SEMI-VOLATILE ORGANICS

MS/MSD No. 30127-1

COMPOUND	SPIKE (ug/kg)	SAMPLE RESULT	CONC MS	% REC	CONC MSD	% REC	RPD	FLAGS
Phenol	4,100	ND	2,400	58	2,000	49	17.0	
2-Chlorophenol	4,100	ND	2,500	61	2,000	49	22.0	
1,4-Dichlorobenzene	4,100	ND	560	14	520	13	7.4	
N-nitrosodi-n-Propylamine	4,100	ND	2,300	56	2,400	58	3.5	
1,2,4-Trichlorobenzene	4,100	ND	1,200	29	1,200	29	0.0	
4-Chloro-3-Methylphenol	4,100	ND	2,600	63	2,200	54	15.0	
Acenaphthene	4,100	ND	2,200	54	2,300	56	3.6	
4-Nitrophenol	4,100	ND	2,100	51	1,800	44	15.0	
2,4 Dinitrotoluene	4,100	ND	2,800	68	2,600	63	7.6	
Pentachlorophenol	4,100	ND	2,000	49	1,800	44	11.0	
Pyrene	4,100	ND	2,700	66	2,700	66	0.0	

RPD = Relative Percent Difference

% REC = Percent Recovery

ADVISORY LIMITS:

	RPD	% RECOVERY
Phenol	35	26 - 90
2-Chlorophenol	50	25 - 102
1,4-Dichlorobenzene	27	28 - 104
N-nitrosodi-n-Propylamine	38	41 - 126
1,2,4-Trichlorobenzene	23	38 - 107
4-Chloro-3-Methylphenol	33	26 - 103
Acenaphthene	19	31 - 137
4-Nitrophenol	50	11 - 114
2,4 Dinitrotoluene	47	28 - 89
Pentachlorophenol	47	17 - 109
Pyrene	36	35 - 142

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons
by Method 8015

Page 1 of 2

Client: Burlington Environmental, Technical Services
Lab No: 30127qcl
Matrix: Soil
Units: mg/kg
Date: March 6, 1993

DUPLICATE

Dup. No. 30127-1

Parameter	Sample(S)	Duplicate(D)	RPD
Total Petroleum Fuel Hydrocarbons	< 10	< 10	0.0
<u>SURROGATE RECOVERY%</u>			
1-chlorooctane	116	102	
o-terphenyl	123	103	

RPD = relative percent difference
$$= [(S - D) / ((S + D) / 2)] \times 100$$

MATRIX SPIKE RECOVERY

MSD No. 30127-1

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Flag
Total Petroleum Fuel Hydrocarbons	< 10	379	495	77	

%R = Percent Recovery
$$= [(MS - SR) / SA] \times 100$$

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

Total Petroleum Fuel Hydrocarbons
by Method 8015

Page 2 of 2

Client: Burlington Environmental, Technical Services
Lab No: 30127qcl
Units: mg/kg
Date: March 6, 1993

BLANK SPIKE RECOVERY

BS No. 054R0101.D

Parameter	Spike Added	Spike Recovered	%R
Total Petroleum Fuel Hydrocarbons	402	386	96

%R = Percent Recovery
= $[(MS - SR) / SA] \times 100$

METHOD BLANK

Blank No. 053R0101.D

Parameter	Blank Value
Total Petroleum Fuel Hydrocarbons	< 10
<u>SURROGATE RECOVERY%</u>	
1-chlorooctane	108
o-terphenyl	111

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

TPH by Method 418.1

Client: Burlington Environmental, Technical Services
Lab No: 30127qc2
Matrix: Soil
Units: mg/kg
Date: March 6, 1993

DUPLICATE

Dup No. 30127-1

Parameter	Sample(S)	Duplicate(D)	RPD
Total Petroleum Hydrocarbons	14	14	0.0

RPD = Relative Percent Difference
$$= [(S - D) / ((S + D) / 2)] \times 100$$

MATRIX SPIKE RECOVERY

MSD No. 30127-1

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Flag
Total Petroleum Hydrocarbons	14	980	1,066	90.6	

%R = Percent Recovery
$$= [(MS - SR) / SA] \times 100$$

METHOD BLANK

Parameter	Blank Value
Total Petroleum Hydrocarbons	< 10

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

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DATA QUALIFIER FLAGS

- ND: Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation limit, corrected for sample dilution.
- J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.
- C: The identification of this analyte was confirmed by GC/MS.
- B1: This analyte was also detected in the associated method blank. The reported sample results have been adjusted for moisture, final extract volume, and/or dilutions performed during extract preparation. The analyte concentration was evaluated prior to sample preparation adjustments, and was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank).
- B2: This analyte was also detected in the associated method blank. However, the analyte concentration in the sample was determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank).
- E: The concentration of this analyte exceeded the instrument calibration range.
- D: The reported result for this analyte is calculated based on a secondary dilution factor.
- A: This TIC is a suspected aldol-condensation product.
- M: Quantitation Limits are elevated due to matrix interferences.
- S: The calibration quality control criteria for this compound were not met. The reported concentration should be considered an estimated quantity.
- X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____.
- X2: Contaminant does not appear to be "typical" product. Further testing is suggested for identification.
- X3: Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended.
- X4: RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is nonhomogeneous.
- X4a: RPD for duplicates outside QC limits due to analyte concentration near the method practical quantitation limit/detection limit.
- X5: Matrix spike was diluted out during analysis.
- X6: Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results.
- X7: Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data.
- X7a: RPD value for MS/MSD outside QC limits due to high contaminant levels.
- X8: Surrogate was diluted out during analysis.
- X9: Surrogate recovery outside QC limits due to matrix composition.
- X10: Surrogate recovery outside QC limits due to high contaminant levels.



CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. 6269

RELINQUISHED BY

RECEIVED BY

SIGNATURE		DATE	TIME	SIGNATURE		DATE	TIME
<i>[Signature]</i>		2-10-93	10:30	<i>[Signature]</i>		2-10-93	10:35
<i>[Signature]</i>		2-10-93	1:10 P	<i>[Signature]</i>		2/10/93	1:10 P
SHIPPING NOTES				LAB NOTES			